ANTISEPTIC EXCISION

OF THE

KNEE-JOINT.

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Reprinted from the Dublin Journal of Medical Science—July, 1880.

DUBLIN:

PRINTED FOR THE AUTHOR

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1880.

ANTISEPTIC EXCISION OF THE KNEE-JOINT.

As the recent discussion on the antiseptic treatment of wounds, and the statistics on the subject which have lately been brought before the profession, cannot fail to modify the practice of many surgeons who have not hitherto adopted that method in its entirety, the following remarks on excision of the knee-joint will not be just now without interest.

The number of splints and appliances which have been devised for use after this operation is sufficient evidence of the difficulty experienced by surgeons in maintaining a proper position of the limb during the somewhat long convalescence which follows it, and this task is now rendered still more difficult, and our choice of a suitable apparatus much restricted, by the necessity for free access to the wound which Mr. Lister's system of dressing requires.

On the other hand, this method of treatment offers peculiar advantages after such a proceedure as excision of the knee—an operation by which large, freshly-divided bone surfaces are exposed in a granulating wound in communication with the air, and by which the patient is usually subjected for many months to the danger of septic infection—a danger which, moreover, in these cases, is much increased by the almost unavoidable occurrence of slight movements between the divided ends of the bones, by which perfect rest in the wound is interfered with. In the absence of antiseptic dressings such movements always exert a most injurious influence on the progress of the case. In the first place, by displacing and wounding the newly-formed tissue, by which repair is accomplished, they directly interfere with the reparative process itself; while, secondly, they favour the absorption of septic material, by causing rupture of the delicate granulation film, to which Mr. Savory has lately prominently alluded, and on which he so much depends, as a natural safeguard against infection. Whether or not this be a correct explanation of the manner in which disturbances of the wound affect the patient's general condition, the fact remains;

and a rather large experience of this operation during the last ten years has convinced me that it is impossible to exaggerate the injurious effect, in some manner produced, by even slight movements of the bones or displacement of the deeper portions of the wound. I have repeatedly verified the bad effect of such disturbances by the evidence of the patient's condition derivable from the pulse and temperature chart, even where no annoyance or pain was referred to the seat of the wound, and I have witnessed the failure of the operation in cases in which the surgeon's efforts to prevent this motion by an apparatus had been unsuccessful, and in which continuous slight disturbances had maintained a permanent derangement of the patient's temperature and nutrition.

From these considerations it follows that, during convalescence after this operation, the seat of the wound should be most carefully kept at rest by the use of a reliable apparatus, and that the bad effects of accidental motion should be as much as possible lessened, and the danger of septic infection otherwise prevented by strict adherence to the details of antiseptic treatment.

We now come to the practical question—What apparatus will secure us, as far as possible, against the evil effects of motion in the wound, and, at the same time, allow the convenient application of the above-mentioned method of treatment?

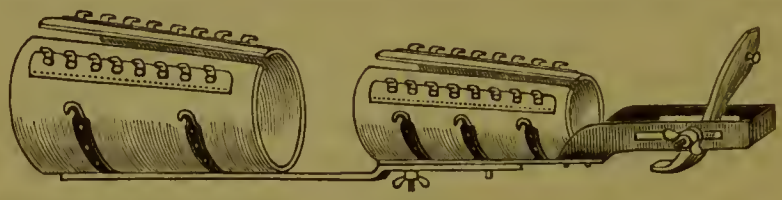
The splints of which we have had experience at the Mater Misericordiæ Hospital fairly represent the different views of surgeons on this subject. They include the modification of M'Intyre's apparatus devised by Mr. Price, the box-splint of Mr. Butcher, the plaster-of-Paris appliance of Mr. Patrick Heron Watson, and the gypsum apparatus recommended by my colleague, Mr. Hayes.

Mr. Hayes' splint, which was described some years ago in this Journal, and which has since been modified by him, was the only one of these which, from its construction, offered facilities for the application of Professor Lister's dressings, and it was accordingly used by me in an excision of the knee, which was performed in May, 1876, under carbolic spray and with full antiseptic precautions. In this case, unfortunately, the gypsum in the neighbourhood of the wound was prevented from setting by frequent dressings under spray, rendered necessary by an unusually large quantity of serous discharge following the operation, and it was for that reason found impossible to maintain aseptism in the wound. Now, this disadvantage, common to every description of plaster-of-Paris apparatus, can no doubt be avoided by deferring

the application of the splint until the profuse discharge of serum and blood caused by the irritant action of the carbolic acid, and which immediately follows the operation, has ceased, and until the danger of reactionary or secondary bleeding has passed away; but this course has the manifest disadvantage of entailing on the exhausted patient a second operation which usually requires anæsthesia, and which is often almost as severe and protracted as the original procedure. It is, moreover, unnecessary, if careful attention be paid to the prevention of hæmorrhage, and if a suitable apparatus be made use of. Surgeons are induced to adopt this course on account solely of the difficulty of readjusting a gypsum apparatus when it has once set, but this circumstance seems rather to afford an argument against the use of the so-called immovable apparatus than furnish one in favour of a practice otherwise so objectionable. Again, this or any form of fixed or immovable splint has for our present purpose a great disadvantage in containing no provision to meet the change in size which the limb undergoes subsequent to the operation, and great skill is consequently required in its application to enable us to strike the happy mean between a splint too tight to allow space for inflammatory swelling and a loosely fitting apparatus, which will prove altogether useless at a later period when inflammatory enlargement has given place to muscular atrophy and contraction.

In some patients, more especially in children and in those in whom the joint degeneration is preceded or accompanied by osteitis, the wasting of muscular structures in the limb has already taken place, and the only subsequent alteration which occurs in its size is the enlargement in the immediate vicinity of the wound; but as a general rule this operation is followed by a considerable diminution in the size of the limb. In muscular adults with languid circulation it is on this account often impossible to apply a gypsum case in such a manner as to allow proper blood supply to the wound, and at the same time with sufficient tightness to make allowance for subsequent atrophy in the muscles of the thigh and leg. In last February the operation was performed by me on a patient of this class, and I was ultimately obliged to amputate the limb; for considerable swelling and œdema occurred in the neighbourhood of the wound, which necessitated such a free division of the plaster case that it finally became useless, and although it was removed and reapplied, it was found in the end impossible to preserve the leg.

Since that date I have made use of the apparatus represented in the accompanying woodcut in three cases of excision of the knee-joint; and experience of this new splint has satisfied me that it is as firm as the gypsum apparatus, far more easy to apply and remove, that it is not injuriously affected by carbolic spray, and, above all, that it can be tightened or the reverse when necessary.



It consists of a posterior bar of polished iron, as in Mr. Hayes' splint, reaching along the thigh and leg, and constructed of two parts, arranged to slide along one another, and clamped together by a screw. To this posterior bar, which is rectangular on section, strong, and rigid, are attached, at intervals, pieces of soft sheet-iron long enough to half encircle the limb. Two pieces of poroplastic material, enclosing the thigh and leg respectively, are riveted to these bands, and are provided with hooks similar to those used by bootmakers, by means of which the splint can be securely laced on to the limb. To the leg or distal end of the posterior bar a foot-piece is attached of the same description as that of the iron splint known as M'Intyre's, and secured by a screw, as in that splint.

It will be noticed, on referring to the illustration, that in the neighbourhood of the wound this apparatus, when applied, presents simply the posterior flat bar of iron, by which alone the thigh and leg portions of the splint are connected, and which is itself removed some distance from the popliteal skin. There is thus no difficulty in the application of the antiseptic dressings, while any swelling, or accumulation of matter in the popliteal space, is open to inspection.

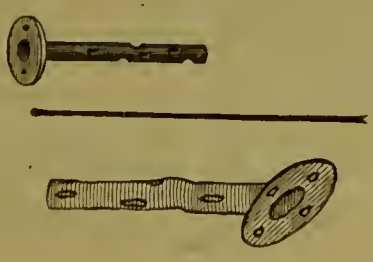
The following is the method of applying the splint:—When the operation has concluded and the hæmorrhage been arrested, by ligatures or otherwise, a piece of "protective" is placed along the wound, and the limb carefully adjusted in the splint, which has previously been heated or dipped into hot water to render the poroplastic felt flexible. A small separate piece of softened felt is now applied along the front of the thigh so as to act as a tongue, and the plastic material moulded, by pressure, to the limb.

The soft iron hoops, of course, yield when pressed upon, so that, when the leg and thigh portions of the splint are drawn together by laces, the limb is most securely held by the apparatus. The protective is then removed under spray, short drainage tubes are placed at each angle of the wound, and wire or carbolised sutures tied along its margins. The gauze dressing should be applied so as to encircle the limb, but not to include the posterior bar. The foot-piece is set at a proper angle, and, when the patient has been placed in bed, the whole apparatus is slung from a strong cradle by means of cords attached to the extremities of the flat hoops of iron, by which the felt is encircled. All danger of the absorption of discharges by the poroplastic material is prevented by the fact that it is situated some distance from the line of incision, and not beneath it, and by the surgeon's adopting the precaution of painting the apparatus over with a thin coat of melting paraffin wax, in which crystals of thymol or of carbolic acid have been dissolved.

As it is often advisable to leave the splint without removal for two or three months, care should be taken in the choice of soft and well-fitting pads, which previous to use should be dipped in a hot saturated solution of boracic acid and thoroughly dried. After this treatment they will be found covered with fine crystals of the acid, the mechanical effect of which is similar to that of powdered French chalk in preventing wrinkling, &c.; while by this means the danger of decomposition or of the entrance of pediculi under the splint is effectually prevented.

The form of drainage tube suitable in these cases, and, indeed, most useful in many wounds over which carbolic gauze dressings are applied, is represented in the accompanying woodcut, and consists of the usual perforated India-rubber, with a broad flange of the same material at one end, attached either obliquely or at a right angle with the axis of the tube.

The obliquely flanged drain is that most generally useful, and will be found especially convenient in securing drainage of the pleural cavity.



These tubes are constructed of the best description of rubber, as recommended by Mr. Lister, and they are quite reliable in this respect, for the very good reason that they cannot be constructed of the impure or vulcanised material. They can be cut to any length, and can be easily inserted by means of a probe notched at the end, as shown in the woodcut. By the use of these drains, which I devised some years ago, and of which I have had a large quantity constructed,[a] the annoyance, caused by the slipping of the ordinary drainage tube altogether into an abscess or wound, is avoided. This is, of course, but a small evil when it occurs with the Neuber drainage-tube of decalcified bone, as indeed it is very liable to do, but the matter becomes rather serious when a rubber tube meets a similar fate, and is perhaps destined to remain (as in a case which I lately heard of) in the patient's pleural cavity as a permanent relic of a former operation.

The following are brief notes of the cases in which I have, up to the present, made use of this splint:—

Case I.—J. M'C., a delicate-looking girl, aged twenty-four, was admitted to the Mater Misericordiæ Hospital in June, 1879, suffering apparently from articular osteitis, with degeneration of the left knee-joint, the disease being of five years' duration. There was no history of injury to the joint, and there was not at any time much pain or swelling in connexion with the disease. The operation, which was performed antiseptically July 9, 1879, revealed, however, the presence of an abscess about the size of a walnut in the head of the tibia, adjoining the left semilunar cartilage, which had been perforated by the opening of its cavity into the joint.

In this case not more than the usual amount of bone was removed, but an aperture was drilled through the tibia from the side, so that a short drainage-tube could be passed into the abscess in the head of the bone, its other end protruding through the angle of the incision in the soft structures. Very slight constitutional disturbance followed the operation, the temperature never rising above 100°, and little or no pain was complained of.

After eight weeks the thumb-screw, by which the leg and thigh portions of the splint were bound together, was loosened temporarily, and bony union ascertained to be quite firm. As, however, the external wound had not closed, it was then thought better, mindful of the cavity which had existed in the tibia, to defer the removal of the apparatus; but, a month later—that is, twelve weeks after the operation—the splint

[a] These drainage tubes are now to be had of all sizes from Messrs. Fannin & Co., of Grafton-street, and from Mr. Whyte, of Sackville-street, Dublin.

was finally removed, and the poroplastic material found as firm as when first applied.

Before leaving the hospital the patient was provided with a suitably-constructed boot, with a heel raised, in order to counterbalance the shortening of the limb. She is now in perfect health, she has a straight leg, and she has recently written from the country stating that she can walk considerable distances without pain or inconvenience.

Case II.—P. M., a healthy-looking man, aged twenty-six, was admitted to the Mater Misericordiæ Hospital suffering from degeneration of the left knee, which had followed a blow received on the outer side of the joint more than five years ago. This patient had been for the previous year in the Thurles Union Hospital, and came up to Dublin in order to have his leg amputated. His case, however, seemed, from every point of view, a most favourable one for excision, and the operation was accordingly performed on October 24.

The articular cartilages were found eroded and diseased, and a small abscess or collection of caseous material was discovered in the substance of the external condyle of the femur, in a situation corresponding to the site of the original injury.

The wound, in this case, united by that peculiar process of repair which we never meet with except under antiseptic conditions, but which is unfortunately so much less frequently seen than described. Union took place by granulations, and the incision was not completely closed for seven weeks; but during that period absolutely no pus or puriform liquid was visible on the dressings, although they were changed only at intervals of from three to seven days.

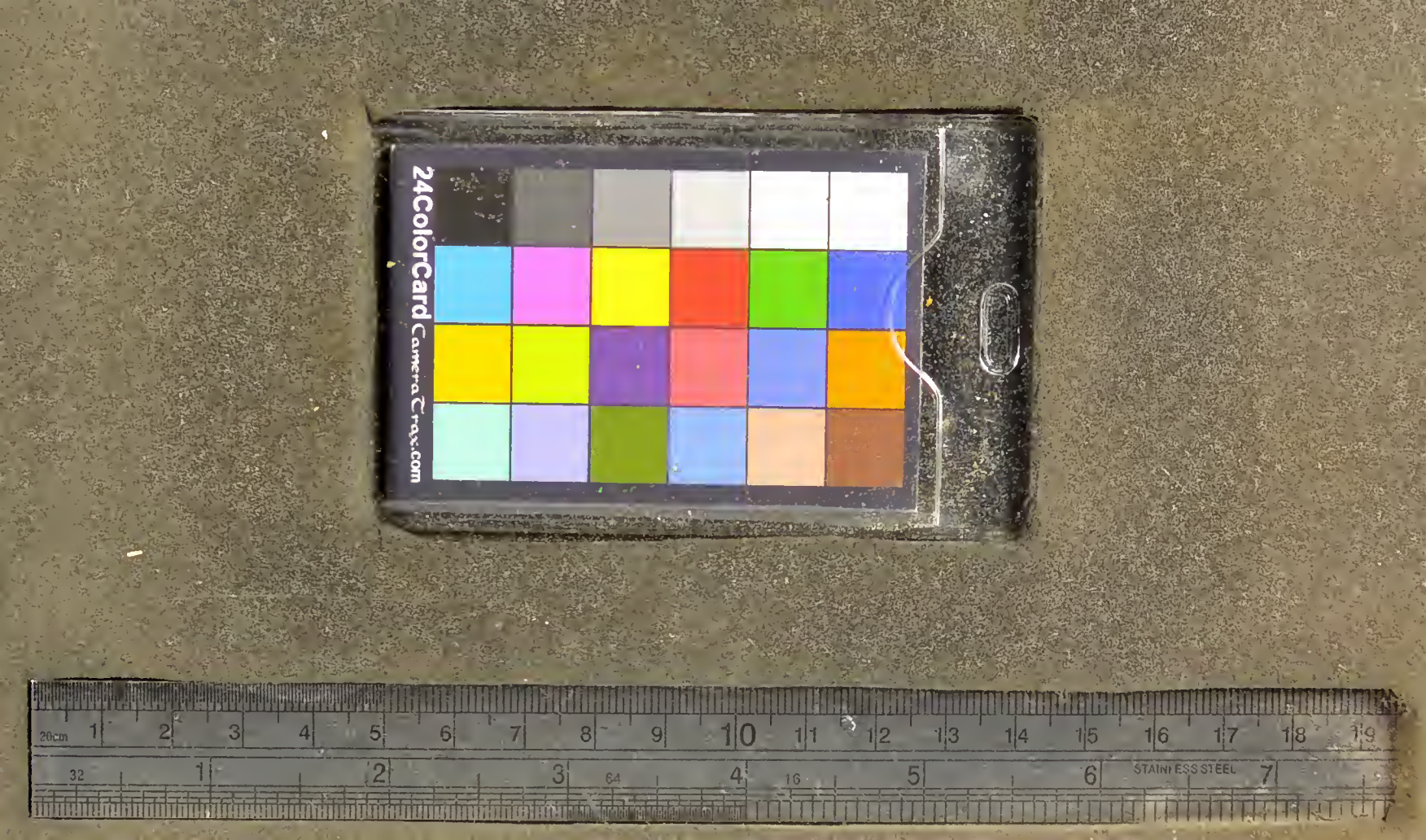
This man left the hospital with a straight and good limb, and I have just ascertained from the country that he is now in perfect health and walking about.

Case III.—M. F., a married woman, aged thirty-two, was admitted to the Mater Misericordiæ Hospital, in last October, suffering from disorganisation of the left knee-joint. In this rather unfavourable case the joint had been for three years semiflexed, the tibia was luxated backwards, and the patella was firmly adherent to the end of the femur. Excision was performed antiseptically on November 16, 1879; and, although the disease was confined to the cartilages and articular extremities, an unusually large amount of the bones required to be removed, and the hamstring tendons to be freely divided on both sides, before the tibia and femur could be placed in position.

This patient, as might be anticipated, has recovered somewhat slowly, and she is still in the hospital; but she has now grown fat, the incision has long since closed, and she is up and walking with some support, her

complete recovery having been retarded chiefly by the occurrence of small cutaneous abscesses in the neighbourhood of the operation wound.

The practice of suspending the leg after operation, so as to allow unavoidable movements of the limb as a whole, while injurious motion at the seat of the operation is prevented, is a most valuable one. It was first adopted, in connexion with Mr. P. H. Watson's splint, by my late friend, Mr. Tyrrell, and on looking over my notes of over thirty excisions of the knee-joint, performed by my colleagues and myself at the Mater Misericordiæ Hospital since I became connected with that institution, I am forcibly reminded of how much we owe to his successful labours in rendering this great operation popular with Dublin surgeons.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